UNIVERSIDADE CATÓLICA PORTUGUESA

The Impact of Rating on Consumers Saving Decisions

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By

Pedro Jorge da Silva

Licensed in Economics

Supervised By

Professor Ricardo Miguel Martins da Costa Ribeiro

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Abstract

This study aims to empirically analyze the impact of the rating given by the rating agency Moody's in the choice of the consumer in Portugal, utilizing the data of nine banks during the period of 2007 to 2014.

The chosen banks were: Banco Popular, Banco Português de Investimento, Banco Espírito Santo, Banif , Caixa Geral de Depósitos, Millennium BCP, Montepio, Montepio, Novo Banco and Santander Totta .

In this analyze I used the interest rate and other observable characteristic like the rating ,the age of banks , the number of branches , the stock market return and the yields of government bonds to explain the consumer decisions.

The model used in this thesis is the nested multinomial logit and for the possibility of this estimation was required to calculate the market share of the market, find instruments for the model like the operational costs per deposits and the loans interest rate, and divide the banks in segments.

The results suggest that the consumer is not sensitive to the rating and the interest rate.

Keywords: deposits, consumers, rating, banks, interest rate

Resumo

Este estudo tem como objetivo analisar empiricamente o impacto do rating dado pela agência de rating Moody´s na escolha do consumidor em Portugal, utilizando dados de nove bancos durante o período de 2007-2014.

Os bancos escolhidos foram: Banco Popular, o Banco Português de Investimento, o Banco Espírito Santo, Banif ,Caixa Geral de Depósitos, o Millennium BCP, o Montepio, o Montepio, Novo Banco e Santander Totta.

Para esta análise eu usei a taxa de juro e outras características observáveis como a classificação, a idade dos bancos, o número de balcões, o retorno do mercado de ações e os rendimentos de títulos do governo para explicar as decisões do consumidor.

O modelo utilizado nesta tese é o nested multinomial logit e para a possibilidade da realização deste modelo foi necessário calcular a quota de mercado, encontrar instrumentos para o modelo tais como os custos operacionais por depósitos e a taxa de juros de empréstimos e dividir os bancos em segmentos.

Os resultados sugerem que o consumidor não é sensível ao rating e à taxa de juro.

Palavras Chave: depósitos, consumidores, rating, bancos, taxa de juro

1. Introduction

Lately the bankruptcy of banks has been the subject of great debate due to the financial crisis and this thesis focuses on this issue to investigate if bank customers take into account the rating before making their deposits.

The financial crisis of 2007 was critical to Portugal, putting the country in a long recession. Portugal is now being characterized by the rating agencies by bad bank practices and bank failures. In order to understand better this state of the country is included two banks that opened bankruptcy: the Banco Espirito Santo which is now Novo Banco and the Banif.

This thesis examines if consumers react to the rating of banks which can be very interesting specifically to investors, in order to improve their choices and change their attitude in face of the reality of banks nowadays.

The research question of this thesis is basically to measure the impact of bank rating on consumer choice. I consider the rating given by Moody's between 2007 and 2014 to nine Portuguese banks: Banco Popular, Banco Português de Investimento, Banco Espírito Santo, Banif, Caixa Geral de Depósitos, Millennium BCP, Montepio, Novo Banco and Santander Totta.

In order to measure the level of sensitivity of the consumers to rating I developed a structural model of demand for bank deposits that takes into account the impact of interest rate , rating as well as other determinants like the age of banks, the number of branches, the stock market return and the yields of government bonds.

I considered a flexible demand model of consumer choice, the nested multinomial logit described in Berry (2004) paper.

I divided the banks in two segments: one group with older banks, with more than fifty years, and a younger group, of banks with less than fifty years.

This demand system not only allows for flexible substitution patterns across the two segments, but also allows me to test straightforwardly statistical hypotheses that evaluate the degree of substitutability between the segments.

I estimated the demand model using instrumental variables techniques. I considered as instruments the operational costs per deposits, the loans interest rate, the operational cost per deposits by segment and the loans interest rate by segment. These instruments were inspired in the instruments of Molnár, Nagy and Horváth (2006) paper. The results suggest that consumers are not sensitive to the ratings of banks and to the interest rate received.

This thesis is organized as follows: chapter 2 presents the literature review and describes alternative existing models of demand and other papers applied to the demand model of the bank sector, chapter 3 presents the demand model chosen, chapter 4 presents the econometric method, chapter 5 presents the description of the data and some preliminary analysis, chapter 6 presents the estimation results, and chapter 8 concludes.

2. Literature Review

2.1 Models of demand

The demand estimation is a key part of my thesis. Dixit and Stiglitz (1977) and Perloff and Salop (1985), recognized the importance of the structure of consumer preferences in the analysis of differentiated products, since the models results are highly sensitive to the assumptions on the consumer preferences.

The most straightforward approach is to utilize the microeconomic traditional theory by specifying a system of demand equations, one for each product. Each equation specifies the demand for a product as a function of its own price, the price of other products, and other determinants.

This is all consistent with economic theory but raises a concern, the first concern the dimensionality problem: supposing if, for example, there are 400 differentiated products, this means 400 equations, 400 prices and implies the estimation of at least 160000 parameters. So the problem increases with the number of products.

This dimensionality problem can be solved by Gorman (1971) approach by dividing the products in smaller groups. He suggests the idea of multi-stage decision for differentiated products, establishing a pyramid structure with a category level demand as the highest level, a middle level that captures demand for specific segments and a lower level that represents demand for particular products.

This multi-stage procedure cannot be estimated using datasets with entry and exit of products and this constitutes serious problems despite the fact that allows to solve the dimensionality problem.

This problem, of datasets with entry and exit of products, can be solved by discrete choice demand models. That attempt to represent choice situations in which consumers choose from a list of options and focus on “only one” choice of the consumer. Basically this type of models are not much theoretically different from I presented above. The difference is the constraints inputted on the choice set. Consumers must choose whether to buy or not a certain product or to spend all of their resources on some alternative good.

The discrete choice demand models are typically augmented using Lancaster (1966) idea suggested that consumers choose products based on their characteristics rather than the products themselves. Basically his idea is that products do not give utility to consumer. It is the characteristics that the good possesses that gives utility, an idea already debated in Strotz (1957, 1959) and Gorman (1959).

Within the discrete choice demand models the most famous one is the multinomial logit (MNL) developed by McFadden (1980), because it allows a large number of dimensions. This model is written down not in terms of the aggregate demand but in terms of market shares and gives a nice analytical expression for the aggregate demand functions of all products.

This gives analysts a simple way of exploring which product characteristics play an important role in determining the levels of market shares of all products. MacFadden (1984), showed that if a good is eliminated from the choice set the consumers who have chosen that good will distribute themselves above the remaining goods, also if the price of one good rises the consumers distribute themselves in other goods. However, the MNL assumptions may create improbable consumer substitution patterns among products.

An alternative demand model is the Nested Multinomial Logit (NMNL) which is more reliable than the MNL and uses is very similar to Hausman (1996) segmentation idea. The difference being that the latter estimated their models in different regressions for each segmentation while the NMNL model allows us to estimate the demand for all products in a single estimation.

The NMNL model assumes that consumers take a two stage decision process.In the first stage they decide which segment of products to buy from, and in the second stage they choose within products in the segments. The NMNL is more flexible than the MNL because allows to capture more realistic substitution patterns, by allowing consumer tastes to be correlated across products.

Some economists have developed more flexible models that put few constraints on the substitution patterns in demand but are computationally more demanding than NMNL and MNL.

2.2 Applications of the demand models to the banking sector

There have been several applications on the above demand models to the banking sector. I will describe four applications.

Dick (2002) estimates a demand model for bank deposit services in order to measure to consumers of dramatic changes in bank services throughout United States branching deregulation in 1990.

She considers a discrete choice model of demand for banking services. Firstly the consumer is assumed to choose one bank for deposit services and this depends on the prices offered by the bank, checking account fees and deposit interest rate paid, and non-price characteristics such as the size of the branch network, branch personal and geographic diversification. She follows Berry (1994) and divides banks in two groups based on their geographic diversification: multi states banks and single state banks and estimates the nested multinomial logit demand model. The results suggest that consumers respond to deposit rates, to a lesser extent and to account fees to choose the bank.

Further, the results also suggest that consumers respond favorably to geographic density, age and size of the banks. Dick (2002) finds important differences across markets because higher income areas are more responsive to prices and bank size, and less to location characteristics relative to lower income areas.

Ardic and Yuzereroglu (2006) use a discrete choice model to analyze the choice of banks of consumers based on bank characteristics and the type of banking

services offered. The study examines the 2001 crisis in Turkey, of which one major component was bank failures. The dependent variables in the model include dummy variables for: public banks, Is Bank (private Turkish bank), large private bank and small private bank as other determinants like: demographics, culture, banking services, and region/branch density.

The model used is the multinomial logit and the findings indicate that age, education, and culture occupation, receipts of salary, closeness of branches, branch density have an important role in the choice of public banks versus private banks and deposit rates do not seem to be much important overall, yet they are still effective in choosing small private banks and these banks are less likely to be chosen on the base of trust.

Molnár, Nagy and Horváth (2006) analyse the degree of competition in the Hungarian household credit and deposit markets using a discrete choice model which is nested multinomial logit. They consider, among others, the following dependent variables: volume of deposits, interest rate, bank's age and number of branches.

Further they segment the banks according their size and power, dividing them in three groups: the large size banks, the medium size banks and the small size banks. They conclude that the explanation to the high price cost margins and low level of price competition is related to the switching costs, barriers to entry in the retail banking, habit formation, marketing activity and competition in credit standards and conditions.

Adams, Brevoort and Kiser (2007) estimated a structural model of consumer choice of depository institutions (banks and thrifts) using a broadly representative panel data set covering 1990 to 2001 in the United States.

They measure the substitutability of depository institutions by estimating a structural empirical model with two dimensions of market segmentation: banks versus thrifts, and multimarket versus single market institutions. The demand estimation procedure uses a slightly altered nested multinomial logit which they called non nested multinomial logit. The dependent variables in the model were the interest rate (which is the result of dividing annual interest paid on deposits by annual total deposits), market shares, institutions accounts per market, institution and market characteristics (rural or urban).

The results suggest the presence of market segmentation between multimarket and single market institutions and between thrifts and banks, where institutions are closer substitutes to institutions within the same grouping than to institutions across groupings. Further, the results also suggest that substitution parameters are larger in rural markets than in urban markets which implies stronger cross group substitution in rural markets and also indicate that banks and thrifts do not appear to be very close substitutes.

3. Theoretical Model

In the Portuguese daily news on November 8, 2011 was published that 66% of Portuguese have on average one bank account so the chosen model was a discrete choice model because the consumer chooses only one particular product.

In line with the literature review presented above, I will consider a NMNL model, which is relatively flexible and computationally straightforward and fast compared other alternatives.

The NMNL starts by assuming that consumers have 1 € to invest and have to choose to deposit the money in a set of banks or on the outside option that includes other choices to consumer, for example invest the money in shares and other options of investment.

Each consumer is assumed to take a two stage decision making process. In the first stage each decide which segment of banks to make the deposit. I will assume two groups: the older banks segment and the younger banks segment. The older and younger banks segment will be defined taking in account the age of the banks.

If a bank is more than fifty years old in Portugal this bank will be included in the older banks segment while if the bank is less than fifty years old in Portugal will be included in the younger bank segment. For example, Montepio exists in Portugal since 1840 giving this bank 177 years of activity. For this reason this bank is grouped in the older bank segment, contrarily, Banco Popular is present

in Portugal since 2003 giving this bank 14 years of activity so will be in the younger bank segment.

Segmenting the banks into older and younger than fifty years, I have that the older segment is constituted by Caixa Geral de Depósitos, Montepio, and Banco Espírito Santo, and consequently the younger banks segment is constituted by Banco Popular, Banif, BPI, Millennium BCP, Santander Totta and Novo Banco.

In the second stage each consumer chooses between the banks inside that group taking in account all characteristics, those observed by me and those not observed. The characteristics observed by me are the interest rate, the rating of the banks given by Moody´s, the number of branches and the years of activity in Portugal.

The interest rate of each bank will capture the rate of return, the rating of Moody´s will capture how solid the bank is and transmits to the consumer witch bank is more secure, the number of branches gives an idea of the geographic dimension over the country and the years of activity in Portugal capture a sense of trust to consumers.

The characteristics not observed by me but observed by consumers are also relevant for their choice. They include for example the marketing of the banks, service quality, reputation, the brand and other characteristics that could not be added to the model.

Denote the segment of banks by $g = 1, \dots, G$ and the set of banks by $j = 1, \dots j$, the outside option will be $j = 0$ which is assumed to be the only member of the segment 0.

For bank $j \in g$ the utility of consumer "i" is $\bar{U}ij = xj\beta - \alpha pj + \xi j + \zeta ig + (1-\sigma)\varepsilon ij$ and for the outside option $j = 0$ the utility is $\bar{U}io = \zeta i0 + (1-\sigma)\varepsilon i0$, where $\bar{U}ij$ denotes the utility that the consumer gets when invests 1 € in the option j, xj is all the characteristics that I observe like for example the rating of Moody's given to the banks , pj is the interest rate of bank j , ξj denotes the characteristics not observable by me, ζig denotes the consumer preference for the segment of banks j , and εij denotes the unobserved preference of the consumer for deposits j .

Cardell (1997) shows if εij is a type I extreme value random variable, then $\zeta ig + (1-\sigma)\varepsilon ij$ also a type I extreme value random variable, since for every consumer any deposit in segment g get the same value of ζig and the parameter introduces a correlation in all consumers tastes across deposits within a segment.

ζig has a distribution that depends on σ with $0 \leq \sigma < 1$ being required for the model to be consistent with utility maximization. As σ approaches to one, the within segment correlation of utilities levels goes to one and because of $(1-\sigma)\varepsilon ij$ works like a deviation, in this case the consumer consider between the products of the segment as σ approaches to zero, the within segment correlation goes to zero approaching the usual MNL model.

The type I extreme value density assumption produces a nice analytical expression for the formula of the market share of bank j in segment g:

$s\frac{j}{g}(\delta) = \frac{e^{\frac{\delta j}{1-\sigma}}}{D_g}$, where δj denotes a product specific common (mean) utility across consumers.

The denominator of this expression for a deposit in segment g is $Dg = \sum_{j\in g} e^{\frac{\delta j}{1-\sigma}}$. Similarly the same is true for the market share of segment g whose formula is given by $sg\ (\delta) = \frac{D^{(1-\sigma)}}{\sum_{k=0}^{G} D_k^{(1-\sigma)}}$.

This yields that the market share of the bank j is given by: $sj\ (\delta)$=$e^{\frac{\delta j}{1-\sigma}}$/ $((D_g^{\sigma}(\sum_{k=0}^{G} D_k^{(1-\sigma)}))$.

4. Econometric Method

Having set out the theoretical model now it is possible to derive a simple analytical for mean utility levels which it can be traduced in this expression $ln\ sj\ (\delta) - ln\ s_0\ (\delta) = \frac{\delta j}{1-\sigma} - \sigma\ ln(D_g)$. This depends on the unknown value of D_g and taking the log of the segment share $ln(D_g) = ln\ s_g\ (\delta) - ln\ s_0$ where the observed segment share is denoted s_g.

Substituting this in the previous formula $\delta_j\ (s, \sigma) = \ln(sj) - \ \sigma \ln(\mathrm{sj/g}) - \ln(s0)$ and setting $\delta_j\ (s, \sigma) = \ x_j\beta - \alpha\rho_j + \xi$ in it for δ_j gives $ln\ sj\ (\delta) - ln\ s_0\ (\delta) = x_j\beta - \alpha\rho_j + \ \sigma \ln(sj/g) + \xi$ so that estimates of β, α, σ can be obtained from a linear instrumental variables regression of differences in log market shares on deposit characteristics , interest rate and the log of the within segment bank .

The usual problem in estimating a market demand model in a differentiated deposits model is that interest rate and within segment bank are both correlated with the unobserved demand factors.

In other words, the interest rate and the within segment bank are likely to be correlated with the unobserved characteristics in the error term ξj because normally those variables change rapidly given any unobserved demand shock (for example: a television advertisement). On the other hand, observed bank attributes such as the branch network take longer to be modified.

Because of these correlations instrumental variable estimation is required to estimate the parameters. The choice of instruments followed Dick (2002) and Molnár, Nagy and Horváth (2006) and consisted of cost shifters.

The instruments include: operational costs per deposits, loans interest rate, the median of operational costs per deposits by segment and the median of loans interest rate by segment. This instruments are likely to be correlated with the interest rate and within segment bank share and not correlated with the error term.

For example, when the operational costs increase the interest rate of deposits decrease and so the within bank share, and this is why the variables are correlated with the endogenous variables

5. Data

5.1 Description of the data

The data covers eight years, from 2007 to 2014 in Portugal, covering the start of the financial crisis to the more recent years and the nine banks chosen are: Banco

Popular, Banif, Banco Espirito Santo, Banco Português de Investimento, Caixa Geral de Depósitos, Millenium BCP, Montepio , Novo Banco and Santander Totta.

5.1.1 Market shares

Following the econometric method of the nested multinomial logit model, the data required to consistently estimate it consists in the following market shares variables: sj which is the bank share of bank j, s_0 which is the share of bank j within segment g and sj/g which is the bank share in net financial assets by segment. In terms of the endogeneity sj , s_0 and $x_j$are the exogenous variables of the model and sj/g and $\rho_j$are the endogenous variables.

The variable sj basically is the ratio of the volume of deposits in each year and each bank observed in the financial report of the banks in the rubric of customer funds doing a sum of the time deposits, demand deposits, structured deposits, saving deposits and the deposits redeemable at notice by the total of net financial assets in Portugal in each year which can be observed in Portuguese Bank official website in the platform BP Stat in the national financial accounts.

The market share of the outside option is the difference between one and the sum of inside option market shares giving the variable s_0. sj/g is the amount of deposits at the end of the year by a certain bank in percentage of the whole deposits in its market segment.

It is calculated by dividing the share of each bank by the sum of the shares of the banks included in each segment.

5.1.2 Deposit interest rate

Another important variable is the deposit interest rate as a proxy for price and was calculated by the ratio of the total of interest and the total of deposits in each year and each bank. The deposit interest is observed in the bank´s annual report by the rubric of interest expense doing the sum of all costumer funds interest which are deposits of residents and no residents. Basically the volume of interest reflects the total amount paid by the banks to the consumers who deposit money in their accounts and dividing by the total of deposits creates a price variable.

5.1.3 Observed characteristics

The most relevant observed characteristic for my thesis is the rating given to the banks by a credit rating agency which in this case is Moody's.

The ratings of the banks were collected of Moody´s official website and is considered always the last rating given at the end of the year. This rating agency uses a classification in this descending order: Aaa ,Aa1, Aa2 , Aa3 , A1 ,A2 , A3, Baa1, Baa2, Baa3, Ba1 , Ba2, Ba3, B1 , B2 , B3 ,Caa1, Caa2, Caa3 , Ca and C . To make a differentiation of the banks and for a possible turning of this no numeric variable into a numeric variable it was necessary to assign to each rating a number starting with the number 1 that corresponds to C rating and ending with the number 21 that corresponds to the rating Aaa.

I included other important observable characteristics like the age of banks variable that is used to define the segments of older and younger banks in the Nested

Multinomial Logit model and was collected of banks official website and the number of branches that was available in the annual financial report of the banks.

I included also other observable variables that have influence in an investor's decision. For example and in a certain way, if the investor does not invest in deposits will invest in the outside option. These variables act like a proxy of the return of the outside option.

The stock market return variable is one of those variables and was computed from the exchange index psi 20. In the Portuguese Bank official website considering always the last value of the year and is calculated by subtracting consequently the year after to the current year to get the variation between years.

The yields of government bonds data complements this proxy of the outside option of the investor and was taken from the Portuguese Bank source in the statistical website Pordata.

5.1.4 Instruments

The instruments of the model are the ratio of operational costs per total deposits and the interest received per the total of loans.

The operational costs are included in the annual financial report of the banks normally in the operational costs section or in the income statement and is the sum of the administrative expenses, staff costs, depreciations and amortizations; the interest received is also found in the bank´s financial reports in the income statement.

The loans can be collected in the bank´s financial reports in the rubric of “Clients Credit” which is sum of the credit of the companies that includes: current accounts, discount and other loans, loans, overdrafts, factoring and leasing with the credit to individuals which includes: housing, consumption, other purposes loans, current accounts and other securitized loans.

Since the market shares are computed by segments, the instruments should be also computed by segments so I computed the median ratio of operational cost by total deposits by segment and the median ratio of loans interest rate by loans by segment.

Table 1 - Descriptive statistics

Description	Average	Median	Stand. Error	Min	Max
Market Share					
Net Financial Assets (Million of €)	321129	317418	14454	303949	348201
Deposits in Banks (Million of €)	23	19	17	2	61
Bank Share in Net Financial Assets (%)	0,007%	0,006%	0,006%	0,001%	0,019%
Bank Share in Net Financial Assets by Segment (%)	24,968%	18,778%	19,527%	2,616%	81,034%
Share of the Outside Option (%)	99,941%	99,940%	0,007%	99,932%	99,955%
Interest Rate					
Deposit Interest Rate (%)	2,524%	2,423%	0,829%	0,540%	4,337%
Observable Characteristics					
Rating	13,000	12,000	4,000	2,000	17,000
Stock Market Return (%)	-2,630%	2,820%	30,851%	-51,290%	33,470%
Yields of Government Bonds (%)	6,175%	4,950%	2,721%	3,800%	10,500%
Number of Branches	570,891	646,000	234,713	173,000	918,000
Age (years)	67,111	32,000	67,555	2,000	177,000
Instrumental Variables					
Operational Cost/ Deposits in Banks (%)	3,460%	3,010%	1,748%	2,173%	14,923%
Loan Interest Rate (%)	8,355%	6,838%	7,564%	1,953%	59,658%
Median Operational Cost/ Deposits in Banks by Segment (%)	3,103%	3,176%	0,436%	2,281%	3,870%
Median Loan Interest Rate by Segment (%)	6,975%	6,919%	1,394%	5,068%	9,448%

Table 1 presents some descriptive statistics. Taking in account the values in Table 1 the median of the volume of deposits is 19.146.682 euros, in terms of the interest rate the median is approximately 2,4 %, the median of the age of banks

is 32 years old, the median of the number of branches is 646 and in terms of the rating´s the median rating is Baa3.

The median of the bank share in net financial assets share and the bank share in net financial assets by segment in Portugal is approximately 0,006 % and 0,18 % which means that over these years the majority of the money is not being invested into deposits in banks and the banks included in the segments have a big share of the total deposits in the market, meaning that mostly of the banks included in the segments have a big market power. Also looking to the median of the share of the outside option with 99,940 % shows that investors invest more in the outside option than deposit the money in banks.

The stock market return have a median of 2,8 % and the variable yields of government bonds have a median of 4,95%. These values are not very usual, the normal behavior is the stock market has higher median than the yields of government bonds because the stock market return has higher risk and by ceteris paribus should have bigger returns. The main reason for this anomalies is the financial crisis. In the years 2007 and 2008 is visible a break in return of the stock market.

The ratio of operational costs per total deposits is 3% and by segment is almost the same value with 3,1 %. The share of the interest loans per the total of loans median is 6,8% and by segment is 6,9%.

5.2 Preliminary analysis

Figure 1 - Relation of Deposits and Interest Rate

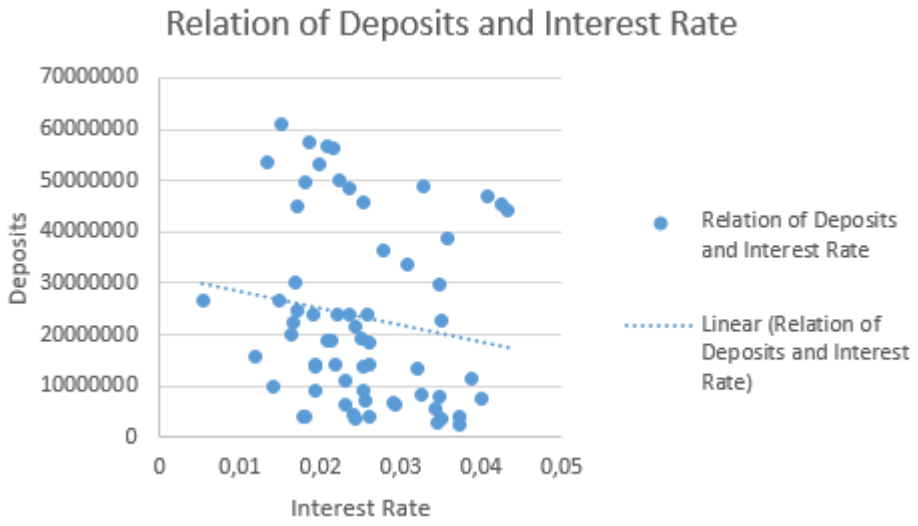

Figure 1 presents the relation between deposits and interest rate. Analyzing the Figure 1 it is visible that investors react to the interest rate with a declining trending line: the volume of deposits decreases with the interest rate.

This behavior is unexpected because an increase in interest rate will make bank deposits more attractive and should encourage saving. The reason might be there are a lot of factors that affect the volume of deposits and one possible explanation to this investor reaction is that after the financial crisis investors lost confidence in banks.

Figure 2 - Relation of Deposits and Rating

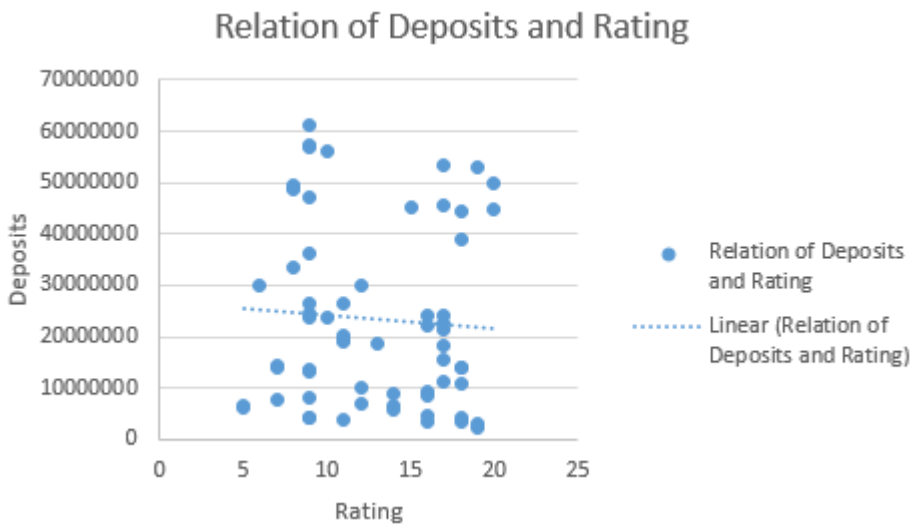

Figure 2 presents the relation between deposits and rating. Analyzing the figure 2 it is visible that investors are not very sensitive to rating but react in a negative way because the trend line is lightly decreasing.

The trend line demonstrates that investors are making more deposits in the banks with more risk and worst rating´s which is unexpected and suggests that the Portuguese investors do not take into account the ratings of the banks when depositing their money.

Another possible reason is that banks with worse ratings may offer higher interest rates.

Table 2 - Results of Demand Estimations

	Ordinary Least Squares (OLS)				Instrumental Variables (IV)			
	1	2	3	4	5	6	7	8
Interest Rate								
Deposit interest Rate	-4.394133	-1.229879	-.1760857	.4860991	-19.54039	1.834123	-8.856301	-5.816755
	(5.798272)	(5.200645)	(1.807433)	(2.852928)	(11.66621)	(7.054085)	(8.633157)	(6.006619)
Observable Characteristics								
Rating	-.0290144	.009836	-.0121478	.0009274	-.0468641	.0115361	-.0224894	-.0063712
	(.0156458)	(.0128617)	(.0074519)	(.0086786)	(.0207829)	(.0126487)	(.0140262)	(.0109323)
Age	.00194**	-.1158628	-.0004899	-.0655581	.0014112	-.1129955	-.0007687**	-.0526805
	(.0006492)	(.0729223)	(.0002899)	(.0521969)	(.0006892)	(.0651117)	(.0004049)	(.0485646)
Number of Branches	.0035555**	.0004652	.0004044	-0,000003	.0035276**	.0004211	.0004181**	-.0000825
	(.0001192)	(.000266)	(.0002269)	(.0002618)	(.000131)	(.0002663)	(.0005297)	(.0002658)
Stock Market Return	-.0580873	-.0583866	-.0921655**	-.0780749	-.1049198	-.0484186	-.1185611	-.1083222**
	(.1257466)	(.0611958)	(.0375198)	(.0411092)	(.1321347)	(.0541296)	(.042781)	(.0372324)
Yields of Government Bonds	-1.080037	2.149829	.2085488	1.243496	.5662314	1.817856	1.13556	1.648652
	(1.383225)	(1.252025)	(.7737452)	(.975233)	(1.676322)	(1.155261)	(1.13921)	(1.345325)
Market Share								
Bank Share in Net Financial Assets by Segment			.882391**	.5946606**			.8740806**	.8239162**
			(.0656593)	(.170701)			(.1528909)	(.1853112)
Dummys								
Banco Popular		-17.16272		-9.37966		-16.85763		-7.072406
		(9.228761)		(6.94513)		(8.192934)		(6.405588)
Banif		-14.81044		-8.116964		-14.54061		-6.149654
		(8.184361)		(6.097506)		(7.266087)		(5.616861)
Banco Espírito Santo		.1703407		.1964723		.1257994		.3077791
		(.5270234)		(.3046365)		(.4955187)		(.3055525)
Banco Português de Investimento		-13.40257		-7.435536		-13.10745		-5.805768
		(7.948115)		(5.796554)		(7.083254)		(5.366676)
Caixa Geral de Depósitos		0,000000		0,000000		0,000000		0,000000
		0,000000		0,000000		0,000000		0,000000
Millennium BCP		-12.77702		-7.155479		-12.50356**		-5.609673
		(7.994064)		(5.731765)		(7.106642)		(5.2726)
Montepio		2.83116		1.723865		2.698764		1.597865
		(2.629656)		(1.718966)		(2.372544)		(1.63046)
Santander Totta		-14.10269		-7.763876		-13.79495		-6.019444
		(8.133422)		(5.983961)		(7.254508)		(5.534462)
Novo Banco		-16.92815		-9.34741		-16.51647		-7.360434
		(10.09913)		(7.356863)		(9.028287)		(6.842279)
Years Trend								
Trend	.0452398	.1870226**	.0415635**	.1210339**	-.0065954	.1906555**	.0120277	.0873351
	(.0314888)	(.0600316)	(.013926)	(.048144)	(.0455812)	(.0495288)	(.034877)	(.0410423)
R^2	0.9271	0.9835	0.9888	0.9925	0.9160	0.9833	0.9852	0.9897

6. Estimation Results

Table 2 presents the demand estimation results with different columns specifications that vary by the variables included and the estimation procedure. Specification 1, 2, 3 and 4 consist of ordinary least squares standard multinomial logit model regressions.

The first specification includes as independent variables the deposit interest rate and the following observable variables: rating, age of the banks, trend, number of branches, stock market return and yields of government bonds. [1]

The interest rate is insignificant in this specification, which suggests that investors do not take in consideration the interest rate when depositing their money in banks. However this result may be biased because the interest rate is correlated with the error term. Both age and number of branches are significant which suggests for investors these observable characteristics are important. Rating, stock market return, yields of government bonds and trend are insignificant to his choice because have the value p under the percentage of five per cent. Although these results are interesting they are with almost certainly biased.

[1] Is important to say that in all specifications in the dummy variables were a bank that was omitted and used for comparison to have better estimates and the bank chosen was the Caixa Geral de Depósitos.

Focusing more in the model, in this specification the market share is the only dependent variable and all other variables are independent variables. Also in all specifications the t-student test was done for all variables and if the “p” value is inferior to 0, 05 % the null hypothesis is rejected and the variable is significant to the model, the significant variables are well indicated with a “**” on their right.

The second specification includes as independent the deposit interest rate, the observable characteristic of observation 1, the trend and dummies for each bank. Adding the dummies to this specification did not impact the significance of the interest rate. Further, the observable variables and the bank dummies are all statistical insignificant suggesting that the investor is not sensitive to them. The trend is positive and significant, suggesting than deposits have been gaining market share over time.

The third specification includes as independent variables the deposit interest rate, the observable characteristic of specification 1, the trend and within segment bank share.

In this specification the interest rate is again insignificant. The stock market return is the only value that is insignificant, and in the other hand, the rating, the number of branches and the yields of government bonds are statistical significant. Also in this specification the trend and the bank share in net financial assets are significant which suggest that there is correlation between the years in the trend and the banks in the segments.

The fourth specification includes basically all variables of the third specification but adds the bank dummies. The interest rate, all the observable characteristics and all bank dummies are not significant. The trend and the within bank segment are significant.

Specification 5, 6, 7 and 8 apply instrumental variable techniques to specifications 1, 2, 3, and 4, respectively. In the specification 5 and 6 the instrumented variable is the interest rate because of the correlation in the previous model OLS and the instruments are the operational costs per deposits, loans interest rate, operational cost per deposits by segment and loans interest rate by segment.

In specification 5 the interest rate is insignificant which suggests the previous idea that investors are not sensitive to the interest rate. The only observed characteristic that is significant is the number of branches. The trend is also not significant.

In specification 6 the interest rate is insignificant which suggests that consumers not search for more attractive options when depositing their money. The rating is insignificant once more which reinforces the idea of the consumer not being sensitive about the rating of each bank when depositing money. Although consumers in general are insensitive to interest rate and rating, the positive values of the coefficients signals that they are rational. Demonstrates that when the rating and the interest rate increase they invest more in bank deposits which is perfectly rational and makes sense.

Let me examine now the other observable variables: age of the banks, number of branches, stock market return and yields of government bonds. They are all insignificant which means that investors also do not take into account these characteristics when depositing money. The trend is significant. The dummy variables for: Banco Espírito Santo, Banco Português de Investimento, Millennium BCP, Montepio, Santander Totta and Novo Banco are insignificant while the Banco Popular and Banif are significant.

I can use the dummy coefficients to infer the valuation of consumers for the different banks, and looking for the negative coefficients, the less valued banks are Banif and Banco Popular. The dummy coefficients for the remaining banks are not significant. [2]

[2] But taking into account the reduced number of observations, if we substitute the rule of "p" bigger than 0,05% for: if the "p" value be inferior to 0,08 % the variable is significant, this would be the right thing to do. So if this is valid the BCP banks comparing to Caixa Geral de Depósitos will the best bank and the other banks are equal to the investor

In the specification 7 and 8, the instrumented variables are the interest rate and the within segment bank share and instrumented by the operational costs per deposits, loans interest rate, operational cost per deposits by segment and loans interest rate by segment.

In the specification 6, the interest rate and the rating are insignificant. The number of branches and the bank age are significant. The trend is not significant while the within segment bank share is significant. The coefficient of the within segment bank share is positive but the confidence interval suggest that the true value may be higher than one. This suggests that specification 6 may represent a better specification.

In the specification 8, the interest rate and the rating are still insignificant which is in agreement with the other specifications. The stock market return is the only observed characteristic that is significant. The segment bank is significant and all bank dummies and trend are insignificant. This specification has higher R^2 than specification 6. However, like in specification 7, the coefficient of the segment bank share is positive but could be higher than one which is inconsistent with utility maximization. For this reason the specification 6 is my preferred specification.

7. Conclusion

This thesis builds a structural model to examine the impact of rating in the choice of consumers.

The results suggest that consumers are not sensitive to the rating established by Moody´s. This suggests that Portuguese investors are not aware of rating, even after bankruptcies of two banks.

The results also suggest that consumers are not sensitive to interest rate. Which indicates that Portuguese investors do not switch banks in search of better interest rates.

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